Getting to Know: Short-Term Climate Change

One of the factors that makes Earth such a hospitable place for life is that the climate is relatively stable. Although the weather may vary from day to day, you can generally predict seasonal variations and overall weather trends. There are also certain areas of Earth that have specific types of climate. For example, rainforests are characterized by warm temperatures and large amounts of precipitation, whereas desert areas can be hot or cold and receive very little rainfall. The stability of Earth’s climate enables life to thrive.

Communities of organisms are adapted for survival in specific climates.

However, the Earth’s system is dynamic, and climate can change. If climate change is gradual, a species can sometimes adapt to the change, often by changing their habitat or behavior or by evolving physically. However, Earth’s climate also undergoes short-term climate change. Although these changes are natural, species can have more difficulty adapting to them. Natural causes of short-term climate change include volcanic eruptions, meteor impacts, sunspot activity, and La Niña or El Niño events.

Misconception 1: Human activity is the only factor that can cause long-term changes in Earth’s climate.

That is not true! Earth’s climate goes through regular, cyclical long-term changes caused partly by variations in Earth’s orbit around the sun. Short-term climate changes can also be caused by natural events like changes in weather patterns.

How do volcanic eruptions affect climate?

When volcanoes erupt, they often release a great deal of ash and gas into the atmosphere. If an eruption is large enough, the dust and gas can circulate in Earth’s atmosphere. This material can block some of the Sun’s energy from reaching Earth’s surface. In general, this has a cooling effect on Earth’s climate. Volcanoes can also release large amounts of carbon dioxide into the air. Carbon dioxide, a greenhouse gas, causes Earth’s climate to warm. A volcanic eruption first has a cooling effect, then it can potentially cause Earth’s climate to warm.
How do meteorite impacts and sunspots affect climate?

Scientists are also studying the effect of other natural events on Earth’s climate. For example, a meteorite impact can release enough dust into Earth’s atmosphere to cause climate change. In fact, many scientists believe that the extinction of the dinosaurs happened as a result of a large meteorite impact that caused Earth’s climate to change. Scientists also know that sunspots occur on the Sun’s surface in regular cycles. These cycles are linked to changes in the amount of energy radiated by the Sun. Although scientists do not completely understand how these phenomena are connected, they suspect that sunspot cycles have an effect on Earth’s climate.

What are El Niño and La Niña?

El Niño and La Niña are cyclical events that disrupt the ocean–atmosphere system in the South Pacific Ocean. These patterns can have an effect on Earth’s climate worldwide. During an El Niño year, ocean temperatures in the South Pacific Ocean are warmer than usual. This causes changes in temperatures on land as well. For example, winters in the central and northern parts of the United States will be warmer as a result of El Niño. Temperatures in the southwest will be cooler during an El Niño year.

La Niña conditions mean that ocean temperatures in the South Pacific are cooler. The effects of La Niña are the opposite of those of El Niño. You’ll learn more about El Niño and La Niña as well as other causes of short-term climate change as you work through the materials in this concept.